US009069305B2

(12) United States Patent
Suzuki et al.

(10) **Patent No.: US 9,069,305 B2**
(45) **Date of Patent: Jun. 30, 2015**

(54) **FIXING DEVICE CAPABLE OF GROUNDING TUBULAR MEMBER**

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 385 days.

(21) Appl. No.: **13/426,784**

(22) Filed: **Mar. 22, 2012**

(65) **Prior Publication Data**

US 2012/0308254 A1 Dec. 6, 2012

(30) **Foreign Application Priority Data**

May 31, 2011 (JP) 2011-122860

(51) **Int. Cl.**
G03G 15/20 (2006.01)
G03G 15/00 (2006.01)
G03G 21/16 (2006.01)

(52) **U.S. Cl.**
CPC ***G03G 15/2053*** (2013.01); *G03G 21/1652* (2013.01); *G03G 15/80* (2013.01)

(58) **Field of Classification Search**
CPC G03G 15/80; G03G 21/1652; G03G 15/2053
USPC 399/90, 329
See application file for complete search history.

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(57) **ABSTRACT**

A fixing device for thermally fixing a developing agent image to a sheet includes: a flexible tubular member having an inner peripheral surface defining an internal space; a heater; a nip member being in sliding contact with the inner peripheral surface of the flexible tubular member and having an electrically conductive surface; a stay supporting the nip member and being electrically conductive and electrically connected to the electrically conductive surface; a backup member nipping the flexible tubular member in cooperation with the nip member; a supporting member supporting the nip member and the stay, the supporting member being movable relative to the backup member; and a first grounding member disposed to be in contact with the stay for grounding the stay, the first grounding member being supported to the supporting member such that the first grounding member is integrally movable with the supporting member.

8 Claims, 7 Drawing Sheets

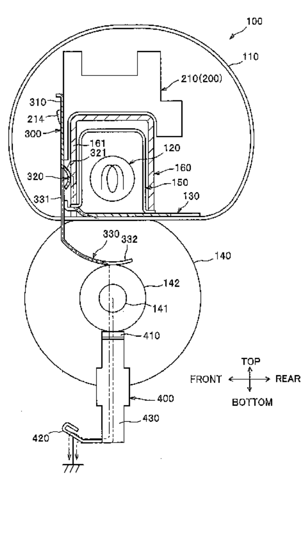

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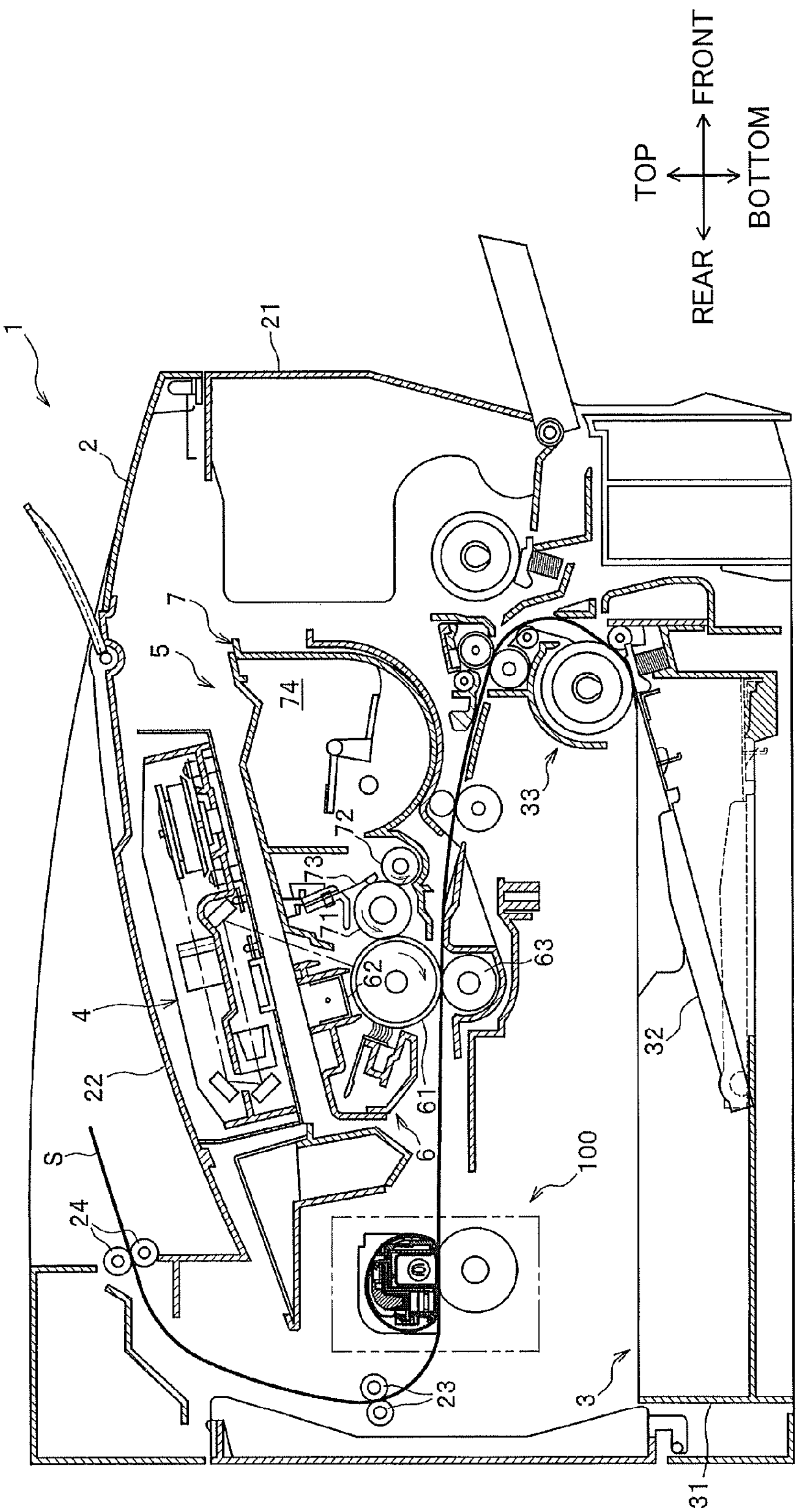
FIG.1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62
61
63
100

FIG.2

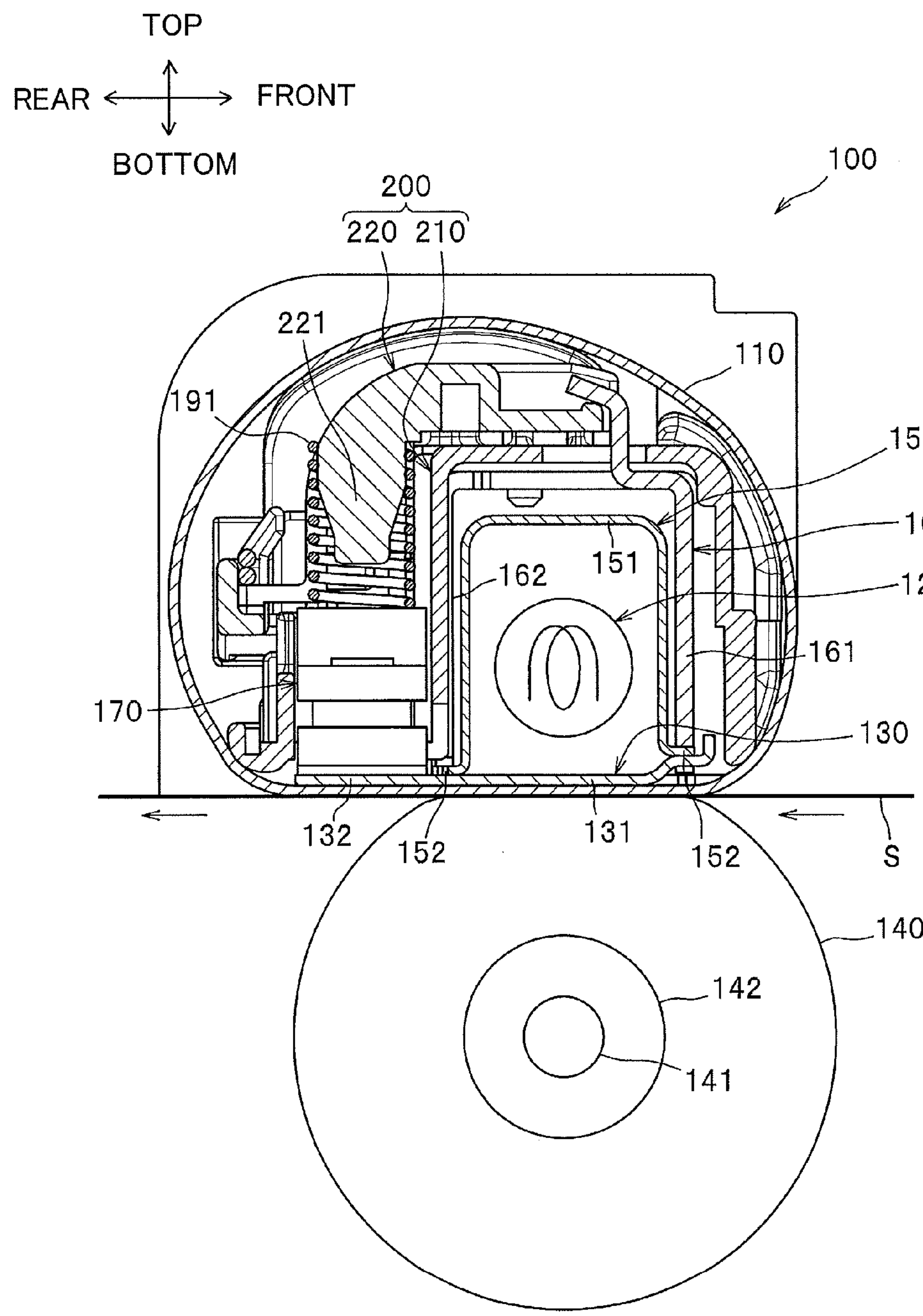
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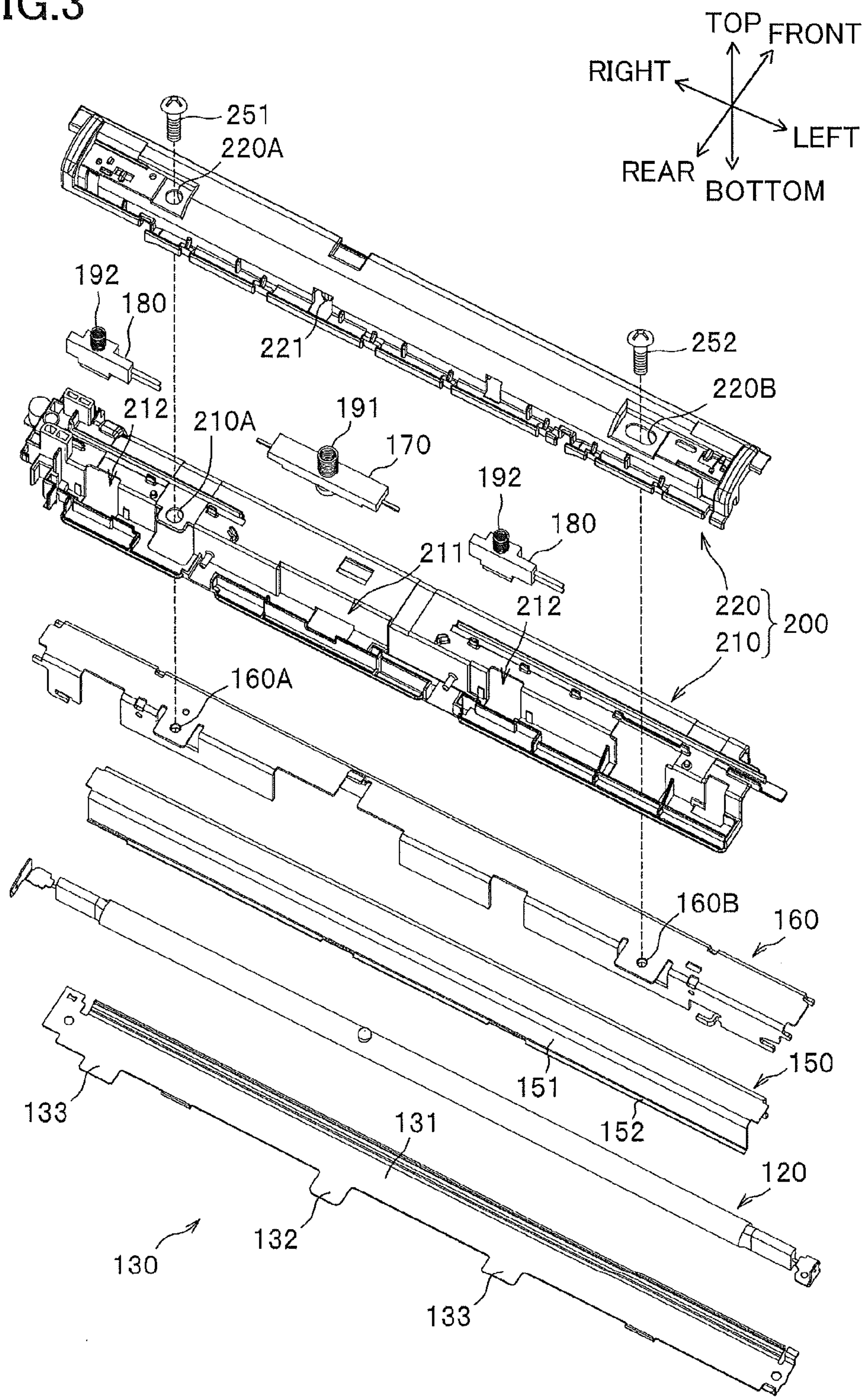
FIG.3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160A
160B
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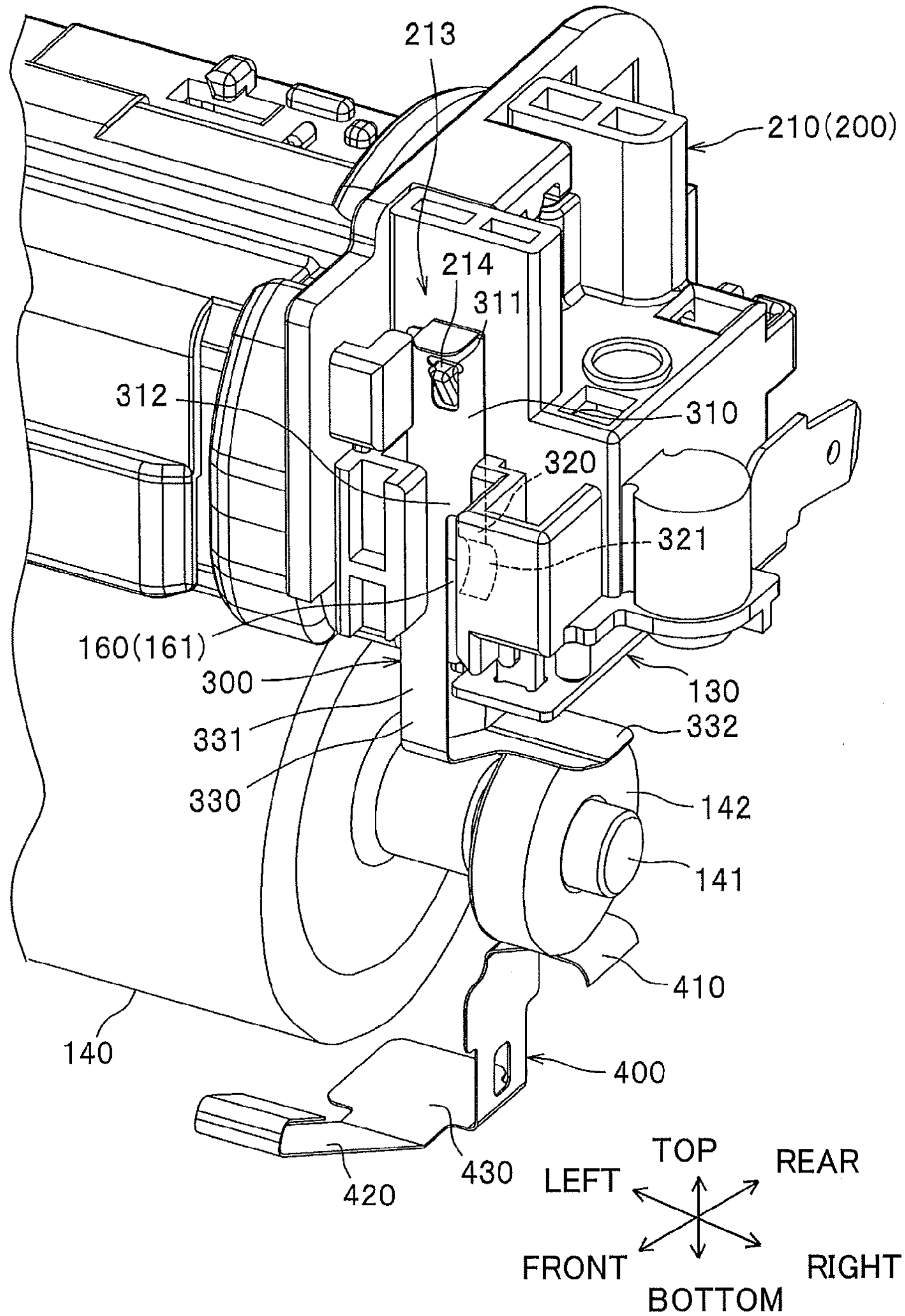
150
152
133
131
120
130
132
133

FIG.4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210(200)
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160(161)
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130
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142
141
410
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FRONT
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FIG.5

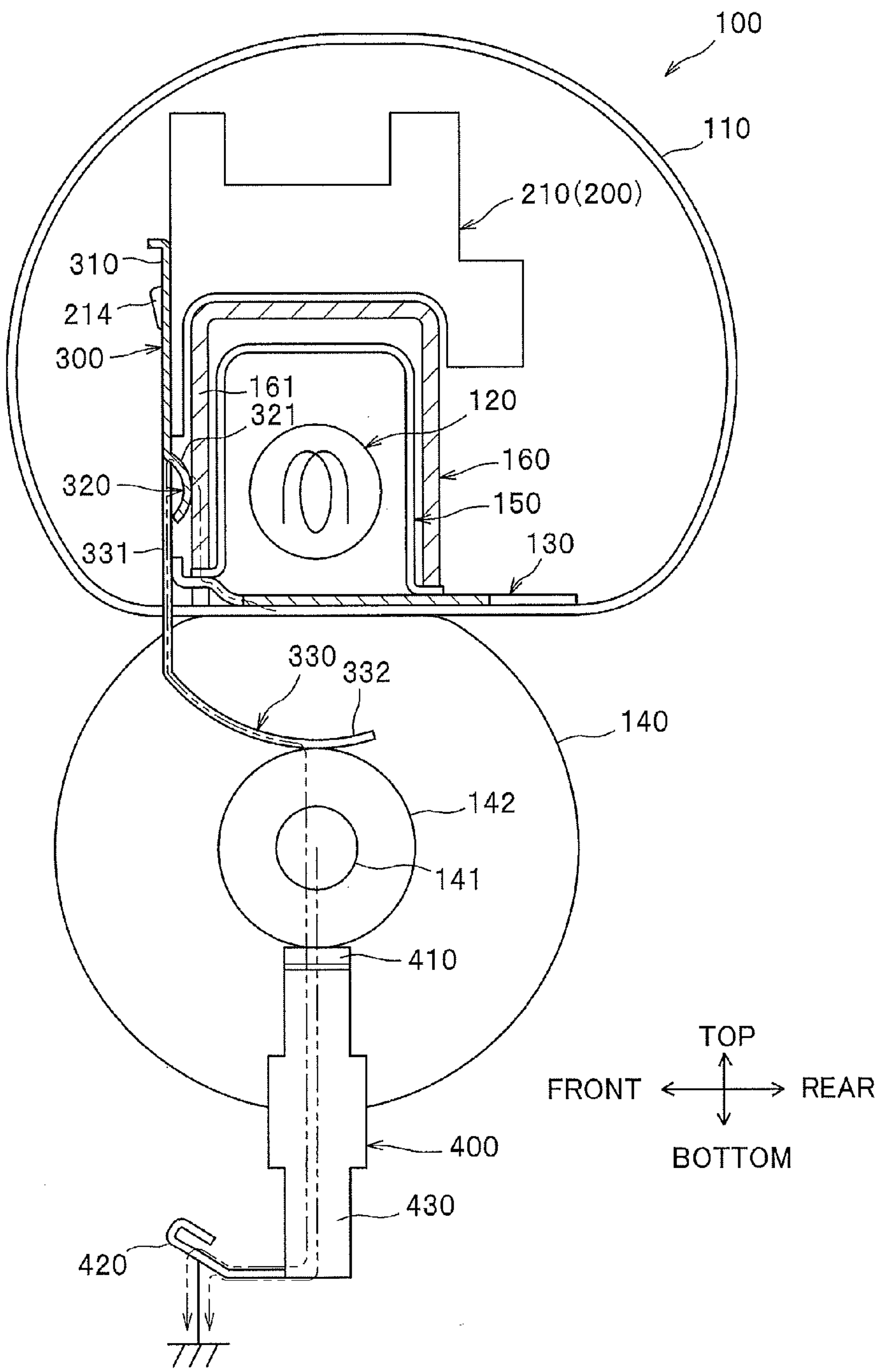
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FIG.6

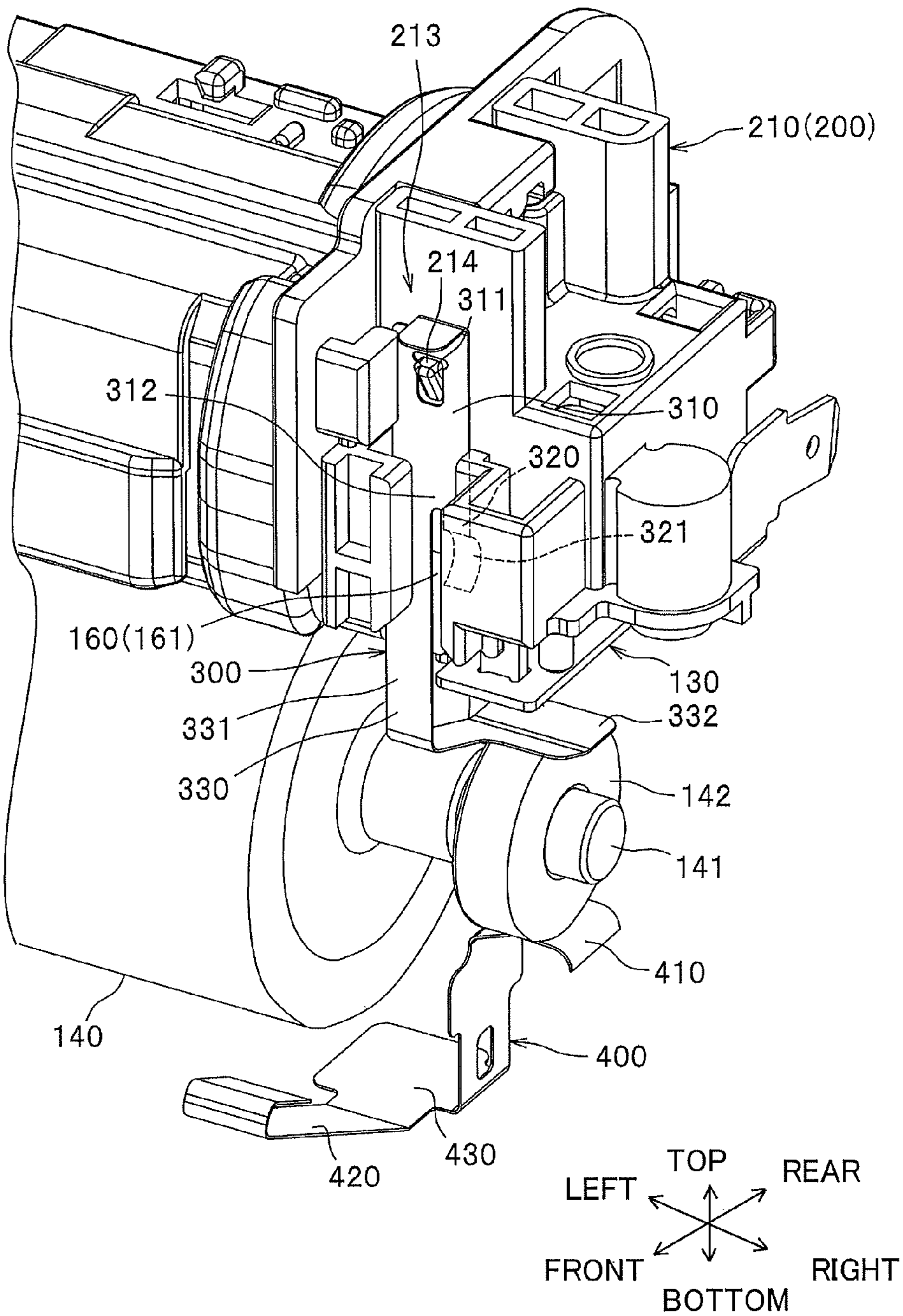

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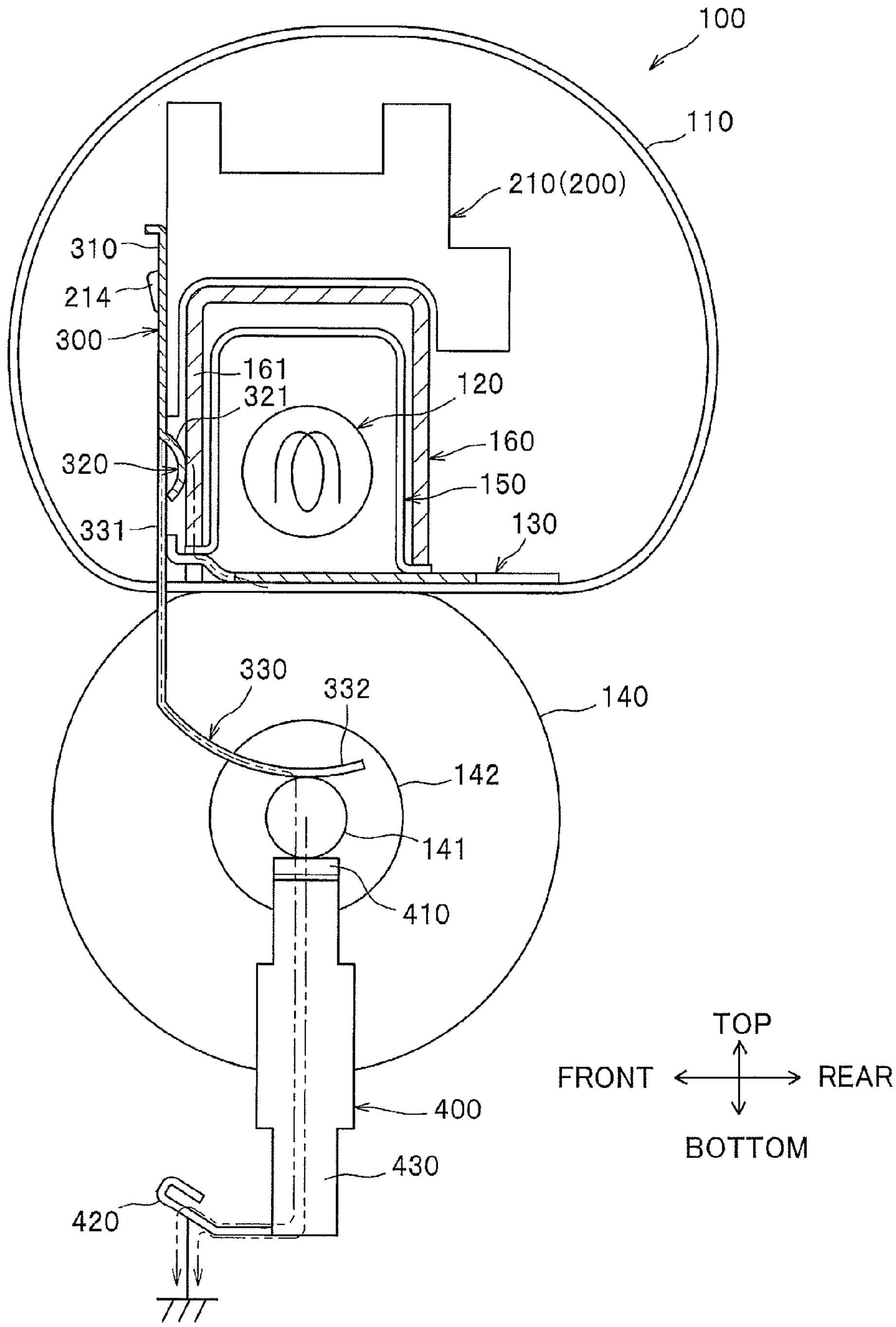
FIG.7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FIXING DEVICE CAPABLE OF GROUNDING TUBULAR MEMBER

CROSS REFERENCE TO RELATED APPLICATION

This application claims priority from Japanese Patent Application No. 2011-122860 filed May 31, 2011. The entire content of the priority application is incorporated herein by reference.

TECHNICAL FIELD

The present invention relates to a fixing device that thermally fixes a transferred developing agent image to a sheet.

BACKGROUND

A conventional thermal fixing device used in an electrophotographic image forming apparatus includes an endless fixing belt (tubular member), a heater disposed at an internal space of the tubular member, a backup member and a heating plate (nip member) that nips the tubular member in cooperation with the backup member. In this fixing device, a recording sheet is conveyed between the tubular member (the nip member) and the backup member for thermally fixing a developer image to the recording sheet.

SUMMARY

In the above-described fixing device, if the tubular member is charged, some developer on the recording sheet may possibly adhere to the tubular member, which may cause contamination of the backup roller or a next recording sheet. Further, when the tubular member is charged, there also arises a problem that some developer which is carried on the recording sheet but not yet fixed thereto may be disturbed. As a result, degradation in image quality could result.

In view of the foregoing, it is an object of the present invention to provide a fixing device capable of suppressing the tubular member from getting charged.

In order to attain the above and other objects, there is provided a fixing device for thermally fixing a developing agent image to a sheet. The fixing device includes: a flexible tubular member having an inner peripheral surface defining an internal space; a heater disposed at the internal space; a nip member disposed at the internal space and configured to be in sliding contact with the inner peripheral surface of the flexible tubular member, the nip member having an electrically conductive surface; a stay disposed at the internal space to support the nip member, the stay being electrically conductive and electrically connected to the electrically conductive surface; a backup member configured to nip the flexible tubular member in cooperation with the nip member; a supporting member configured to support the nip member and the stay, the supporting member being movable relative to the backup member; and a first grounding member disposed to be in contact with the stay for grounding the stay, the first grounding member being supported to the supporting member such that the first grounding member is integrally movable with the supporting member.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings:

FIG. **1** is a schematic cross-sectional view illustrating a general configuration of a laser printer provided with a fixing device according to an embodiment of the present invention;

FIG. **2** is a schematic cross-sectional view of the fixing device according to the embodiment, the fixing device including a fusing belt and a backup roller;

FIG. **3** is an exploded perspective view of the fixing device according to the embodiment, the fixing device including a nip plate, a halogen lamp, a reflection member, a stay, a cover member, a thermostat and two thermistors;

FIG. **4** is an enlarged perspective view of a right end portion of the fixing device according to the embodiment during image formation, the right end portion of the fixing device including a first grounding member and a second grounding member;

FIG. **5** is a schematic view of the right end portion of the fixing device according to the embodiment, explaining how the fusing belt is grounded via the first grounding member, the second grounding member and the backup roller;

FIG. **6** is an enlarged perspective view of the right end portion of the fixing device when a paper jam is addressed; and

FIG. **7** is a schematic view of a right end portion of a fixing device according to a variation of the present embodiment.

DETAILED DESCRIPTION

First, a general configuration of a laser printer **1** incorporating a fixing device **100** according to an embodiment of the present invention will be described with reference to FIG. **1**. In the following description, a general structure of the laser printer **1** will be described first and a detailed structure of the fixing device **100** will be then described.

Throughout the specification, the terms "above", "below", "right", "left", "front", "rear" and the like will be used assuming that the laser printer **1** is disposed in an orientation in which it is intended to be used. More specifically, in FIG. **1**, a right side, a left side, a near side and a far side of the laser printer **1** are referred to as a front side, a rear side, a left side and a right side, respectively.

As shown in FIG. **1**, the laser printer **1** includes a main frame **2** provided with a movable front cover **21**. Within the main frame **2**, a sheet supply unit **3** for supplying a sheet S, an exposure unit **4**, a process cartridge **5** for transferring a toner image (developing agent image) on the sheet S, and the fixing device **100** for thermally fixing the toner image onto the sheet S are provided.

The sheet supply unit **3** is disposed at a lower portion of the main frame **2**. The sheet supply unit **3** includes a sheet supply tray **31** for accommodating the sheet S, a lifter plate **32** for lifting up a front side of the sheet S, a sheet conveying mechanism **33**. Each sheet S accommodated in the sheet supply tray **31** is lifted upward by the lifter plate **32**, and is conveyed toward the process cartridge **5** by the sheet conveying mechanism **33**.

The exposure unit **4** is disposed at an upper portion of the main frame **2**. The exposure unit **4** includes a laser emission unit (not shown), a polygon mirror, lenses and reflection mirrors (shown without reference numerals). In the exposure unit **4**, the laser emission unit emits a laser beam (indicated by a chain line in FIG. **1**) based on image data such that a surface of a photosensitive drum **61** (described later) is exposed by high speed scanning of the laser beam.

The process cartridge **5** is disposed below the exposure unit **4**. The process cartridge **5** is detachably loadable in the main frame **2** through an opening defined when the front cover **21** of the main frame **2** is opened. The process cartridge **5** includes a drum unit **6** and a developing unit **7**.

The drum unit **6** includes the photosensitive drum **61**, a charger **62**, and a transfer roller **63**. The developing unit **7** is detachably mounted on the drum unit **6**. The developing unit **7** includes a developing roller **71**, a supply roller **72**, a thickness-regulation blade **73**, and a toner accommodating portion **74** in which toner (developing agent) is accommodated.

In the process cartridge **5**, after the surface of the photosensitive drum **61** has been uniformly charged by the charger **62**, the surface is exposed to the high speed scanning of the laser beam from the exposure unit **4**. An electrostatic latent image based on the image data is thereby formed on the surface of the photosensitive drum **61**. The toner accommodated in the toner accommodating portion **74** is supplied to the developing roller **71** via the supply roller **72**. The toner then enters between the developing roller **71** and the thickness-regulation blade **73** to be carried on the developing roller **71** as a thin layer having a uniform thickness.

The toner borne on the developing roller **71** is supplied to the electrostatic latent image formed on the photosensitive drum **61**, thereby developing the electrostatic latent image into a visible toner image. The toner image is thus formed on the surface of the photosensitive drum **61**. Subsequently, when the sheet S is conveyed between the photosensitive drum **61** and the transfer roller **63**, the toner image formed on the photosensitive drum **61** is transferred onto the sheet S.

The fixing device **100** is disposed rearward of the process cartridge **5**. The toner image (toner) transferred onto the sheet S is thermally fixed on the sheet S while the sheet S passes through the fixing device **100**. The sheet S on which the toner image has been thermally fixed is then conveyed by conveying rollers **23**, **24** to be discharged onto a discharge tray **22** formed on an upper surface of the main frame **2**.

Next, a detailed structure of the fixing device **100** according to the embodiment of the present invention will be described with reference to FIGS. **2** through **6**.

As shown in FIG. **2**, the fixing device **100** includes a flexible fusing belt **110** as a tubular member, a halogen lamp **120** as a heater, a nip plate **130** as a nip member, a backup roller **140** as a backup member, a reflection member **150**, a stay **160**, a thermostat **170** and two thermistors **180** (see FIGS. **3**, **4**), a cover member **200**, a first grounding member **300** (see FIG. **4**) and a second grounding member **400** (see FIG. **4**).

The fusing belt **110** is of an endless belt (of a tubular configuration) having heat resistivity and flexibility. The fusing belt **110** has an inner peripheral surface that defines an internal space within which the halogen lamp **120**, the nip plate **130**, the reflection member **150**, the stay **160** and the cover member **200** are disposed. The fusing belt **110** extends in a left-to-right direction. Hereinafter, the left-to-right direction in which the fusing belt **110** extends may also be referred to as an axial direction of the fusing belt **110**, wherever necessary. The fusing belt **110** has widthwise end portions in the axial direction that are guided by guide members (not shown) so that the fusing belt **110** is circularly movable. In the embodiment, the fusing belt **110** is made from a metal, for example, a stainless steel.

The halogen lamp **120** is a heater to generate radiant heat to heat the nip plate **130** and the fusing belt **110** for heating toner on the sheet S. The halogen lamp **120** is positioned at the internal space of the fusing belt **110** such that the halogen lamp **120** is spaced away from an inner surface of the nip plate **130** by a predetermined distance.

The nip plate **130** has a plate-like shape and is adapted to receive radiant heat from the halogen lamp **120**. To this effect, the nip plate **130** is positioned at the internal space of the fusing belt **110** such that the inner peripheral surface of the fusing belt **110** is slidably movable with a lower surface of the nip plate **130**. The nip plate **130** is made from a metal. In the embodiment, the nip plate **130** is made of aluminum having a thermal conductivity higher than that of the stay **160** (described later) made from a steel. For fabricating the nip plate **130**, an aluminum plate is bent to provide a base portion **131**, a first protruding portion **132**, and two second protruding portions **133**, as shown in FIG. **3**.

The base portion **131** is flat and extends in the left-to-right direction. The base portion **131** has a lower surface that is in sliding contact with the inner peripheral surface of the fusing belt **110**. The base portion **131** transmits the radiant heat from the halogen lamp **120** to the toner on the sheet S via the fusing belt **110**.

The base portion **131** has a rear end portion from which the first protruding portion **132** and the two second protruding portions **133** protrude rearward respectively. Each of the first protruding portion **132** and the second protruding portions **133** has a substantially flat plate-like shape.

The first protruding portion **132** is formed at a position adjacent to a lateral center of the rear end portion of the base portion **131** in the left-to-right direction. The first protruding portion **132** has an upper surface on which the thermostat **170** is disposed to confront the same, and a lower surface that faces the backup roller **140**.

The two second protruding portions **133** are formed such that one of the second protruding portions **133** is arranged at a position adjacent to a right end portion of the rear end portion of the base portion **131**, while the other second protruding portion **133** is arranged at a position adjacent to the lateral center of the rear end portion but leftward of the first protruding portion **132** in the left-to-right direction. Each second protruding portion **133** has an upper surface on which one of the two thermistors **180** is disposed to face the same.

The nip plate **130** is supported to the cover member **200**. The cover member **200** is biased toward the backup roller **140**, and therefore the nip plate **130** is also biased toward the backup roller **140**.

The backup roller **140** is disposed below the nip plate **130** such that the backup roller **140** nips the fusing belt **110** in cooperation with the nip plate **130**, as shown in FIG. **2**. The backup roller **140** includes a metal roller shaft **141** extending in the left-to-right direction. This roller shaft **141** is rotatably supported to a metal bearing, for example, a ball bearing **142** in the embodiment. Specifically, as shown in FIG. **4**, the roller shaft **141** is inserted into and coupled to an inner race of the ball bearing **142** such that the roller shaft **141** is rotatable. The ball bearing **142** is supported to a casing (not shown) of the fixing device **100** such that the first grounding member **300** can be in contact with an upper portion of the ball bearing **142** and the second grounding member **400** can be in contact with a lower portion of the ball bearing **142**, as will be described later. In the embodiment, the casing of the fixing device **100** does not have electrical conductivity. The backup roller **140** is configured to rotate upon receipt of a driving force transmitted from a motor (not shown) disposed within the main frame **2**. As the backup roller **140** rotates, the fusing belt **110** is circularly moved along the nip plate **130** because of a friction force generated between the backup roller **140** and the fusing belt **110** or between the sheet S and the fusing belt **110**. The toner image on the sheet S can be thermally fixed thereto by heat and pressure during passage of the sheet S between the backup roller **140** and the fusing belt **110**.

The reflection member **150** is adapted to reflect radiant heat from the halogen lamp **120** toward the nip plate **130**. As shown in FIG. **2**, the reflection member **150** is positioned at the internal space of fusing belt **110** to surround the halogen lamp **120** with a predetermined distance therefrom. Thus, heat from the halogen lamp **120** can be efficiently concentrated onto the nip plate **130** to promptly heat the nip plate **130** and the fusing belt **110**.

The reflection member **150** has a U-shaped cross-section and is made from a material such as aluminum having high reflection ratio regarding infrared ray and far infrared ray. Specifically, the reflection member **150** has a U-shaped reflection portion **151** and two flange portions **152** each extending outward (frontward or rearward) from each end portion of the reflection portion **151** in the front-to-rear direction.

The stay **160** is adapted to support each end portion of the nip plate **130** in the front-to-rear direction. The stay **160** is disposed at the internal space of the fusing belt **110** so as to cover the halogen lamp **120** and the reflection member **150**. For covering the reflection member **150** and the halogen lamp **120**, the stay **160** has a U-shaped configuration in conformity with an outer profile of the U-shaped reflection member **150** (reflection portion **151**). For fabricating the stay **160**, a highly rigid member such as a steel plate is folded into U-shape.

More specifically, the stay **160** is disposed at a side opposite to that of the backup roller **140** with respect to the nip plate **130**, as shown in FIG. **2**. The stay **160** has a front wall **161** whose bottom end portion supports a front end portion of the nip plate **130** from upward thereof via the flange portion **152**. The stay **160** also has a rear wall **162** whose bottom end portion supports a rear end portion of the nip plate **130** from upward thereof via the flange portion **152**. In other words, the nip plate **130** and the stay **160** nip the flange portions **152** of the reflection member **150** therebetween. The stay **160** has an upper wall on which two screw holes **160**A, **160**B are formed to receive screws **251**, **252** respectively for fixing the cover member **200** to the stay **160**.

The stay **160** is adapted to receive a force applied to the nip plate **130** from the backup roller **140** and to support the nip plate **130**. Here, the force applied to the nip plate **130** from the backup roller **140** refers to a reaction force generated in response to a force with which the nip plate **130** biases the backup roller **140**.

The thermostat **170** is configured to detect a temperature of the nip plate **130**. The thermostat **170** has a lower surface serving as a temperature detecting surface. As shown in FIG. **2**, the thermostat **170** is disposed at the internal space of the fusing belt **110** such that the lower surface of the thermostat **170** opposes the upper surface of the first protruding portion **132** of the nip plate **130**. Further, the thermostat **170** is adapted to be coupled to a first positioning portion **211** (described later) formed on a first cover member **210** of the cover member **200**. The thermostat **170** is thus positioned in the front-to-rear direction as well as in the left-to-right direction. The thermostat **170** is further biased toward the first protruding portion **132** by a coil spring **191**. With this construction, the thermostat **170** is stably positioned relative to the nip plate **130**. Hence, the thermostat **170** can detect the temperature of the nip plate **130** with accuracy.

The thermistors **180** are temperature sensors configured to detect the temperature of the nip plate **130**. Each thermistor **180** has a lower surface serving as a temperature detecting surface. The two thermistors **180** are disposed at the internal space of the fusing belt **110** such that the lower surface of each thermistor **180** opposes the upper surface of each second protruding portion **133** of the nip plate **130**.

Further, each thermistors **180** is adapted to be coupled to each second positioning portion **212** (described later) formed on the first cover member **210** of the cover member **200**. The thermistors **180** are thus positioned in the front-to-rear direction as well as in the left-to-right direction. Each thermistor **180** is further biased toward each second protruding portion **133** by a coil spring **192**. With this construction, the thermistors **180** are stably positioned relative to the nip plate **130**. The thermistors **180** can therefore detect the temperature of the nip plate **130** with accuracy.

The cover member **200** is adapted to support the nip plate **130** and the stay **160**. The cover member **200** is disposed at the internal space of the fusing belt **110** so as to cover the stay **160**, as shown in FIG. **2**. In the embodiment, the cover member **200** is made from a resin, for example, a liquid crystal polymer, a PEEK resin (polyether ether ketone resin), or a PPS resin (polyphenylene sulfide resin).

The cover member **200** includes the first cover member **210** and a second cover member **220**, as shown in FIG. **3**.

The first cover member **210** has a substantially U-shaped cross-section and extends in the left-to-right direction. The first cover member **210** includes the first positioning portion **211**, two second positioning portions **212**, a supporting portion **213** (see FIG. **4**) and a through-hole **210**A. As described above, the first positioning portion **211** serves to position the thermostat **170**, and each second positioning portion **212** serves to position each thermistor **180**. The supporting portion **213** serves to support the first grounding member **300**, as will be described later. The through-hole **210**A is formed on an upper wall of the first cover member **210** for allowing the screw **251** to penetrate therethrough. The supporting portion **213** is formed on a right end portion of the first cover member **210**, more specifically, on a front surface of the right end portion of the first cover member **210**, as shown in FIG. **4**. The supporting portion **213** is formed to have a recessed portion that opens frontward for mounting the first grounding member **300**.

The supporting portion **213** has a protrusion **214** that protrudes frontward. The protrusion **214** engages an engaging hole **311** (described later) formed on the first grounding member **300**. Specifically, the protrusion **214** is formed to slope relative to a top-to-bottom direction such that the protrusion **214** approaches the front surface of the right end portion of the first cover member **210** as extending downward. This slope of the protrusion **214** serves to facilitate engagement of the protrusion **214** with the engaging hole **311** of the first grounding member **300** when the first grounding member **300** is inserted upward to be mounted on the first cover member **210**.

As shown in FIGS. **2** and **3**, the second cover member **220** has a substantially L-shaped cross-section and extends in the left-to-right direction. The second cover member **220** has an upper wall on which three supporting portions **221** (only one is shown in FIG. **3**) and two screw holes **220**A, **220**B are formed. Specifically, each supporting portion **221** has a boss-like shape protruding downward from a lower surface of the upper wall of the second cover member **220** for supporting one of the coil springs **191**, **192**. The screws **251**, **252** are respectively inserted into the screw holes **220**A, **220**B.

For fixing the cover member **200** to the stay **160**, the screw **251** is inserted into the screw hole **220**A and the through-hole **210**A such so that the screw **251** can be screwed into the screw hole **160**A of the stay **160**. The screw **252** is screwed into the screw hole **160**B via the screw hole **220**B. As described above, the stay **160** supports the nip plate **130**. The cover member **200** is supported to the casing (not shown) of the fixing device **100**. In other words, the cover member **200** supports the stay **160**, and also supports the nip plate **130** via the stay **160**.

As shown in FIG. **4**, the cover member **200** is biased toward the backup roller **140** by a biasing member (not shown), and is configured to be movable relative to the backup roller **140** in the top-to-bottom direction. The nip plate **130** and the stay **160** are supported to the cover member **200**, and therefore the nip plate **130** and the stay **160** are integrally movable with the cover member **200** relative to the backup roller **140**.

With this construction, during image formation, the cover member **200** is moved to a position closest to the backup roller **140** such that the nip plate **130** and the backup roller **140** are in pressure contact with each other. In case that a paper jam occurs at the fixing device **100**, the cover member **200** is moved away from the backup roller **140** so as to release pressure contact between the nip plate **130** and the backup roller **140**, as shown in FIG. **6**.

The first grounding member **300** serves to ground the stay **160**. The first grounding member **300** is made from a metal plate in its entirety. The first grounding member **300** includes a mount portion **310**, a first conducting portion **320** and a second conducting portion **330**.

The mount portion **310** is supported to the supporting portion **213** of the first cover member **210**. As shown in FIG. **4**, the mount portion **310** is formed with the engaging hole **311** that is engageable with the protrusion **214** of the supporting portion **213**.

The mount portion **310** has a lower end portion bifurcating into the first conducting portion **320** and the second conducting portion **330**. More specifically, the first conducting portion **320** extends downward from a right end portion of the mount portion **310**, and the second conducting portion **330** extends downward from a left end portion of the mount portion **310**.

As shown in FIG. **5**, the first conducting portion **320** first extends downward and then curves to provide a curved portion **321** that is convex rearward. The curved portion **321** is in contact with the stay **160**. Since the first grounding member **300** is supported to the first cover member **210** together with the stay **160**, the first conducting portion **320** can be stably positioned relative to the stay **160** regardless of the movement of the first cover member **210**. Hence, the first conducting portion **320** can be stably in contact with the stay **160**.

Referring to FIG. **5**, the second conducting portion **330** includes an extending section **331** and a first contact portion **332**. The extending section **331** extends downward from the mount portion **310**. The first contact portion **332** extends diagonally downward and rearward from a bottom end portion of the extending section **331**. The first contact portion **332** is adapted to be in contact with the ball bearing **142** of the backup roller **140**.

The first contact portion **332** has a substantially L-shape in a top view, as shown in FIG. **4**. A portion of the first contact portion **332** that is in contact with the ball bearing **142** has a width wider than that of remaining portion of the first contact portion **332** in the left-to-right direction.

When the nip plate **130** and the backup roller **140** are in pressure contact with each other, the first contact portion **332** is in contact with an outer race of the ball bearing **142** (see FIGS. **4** and **5**). When the nip plate **130** is separated from the backup roller **140**, the first contact portion **332** is in separation from the outer race of the ball bearing **142**, as shown in FIG. **6**. The extending section **331** is designed to have a length in the top-to-bottom direction that allows the first contact portion **332** to be in contact with and separated from the outer race of the ball bearing **142**, depending on the position of the nip plate **130** relative to the backup roller **140**. With this construction, a force exerted on the second conducting portion **330** and the ball bearing **142** can be made smaller, compared to a construction in which the second conducting portion **330** is always in contact with the ball bearing **142**.

Referring to FIG. **5**, the first conducting portion **320** is positioned closer to the second grounding member **400** than the mount portion **310** to the second grounding member **400** in the top-to-bottom direction. The second conducting portion **330** bridges between the mount portion **310** and the first conducting portion **310**. In other words, the first conducting portion **320** and the second conducting portion **330** are connected via a connecting portion **312** (see FIG. **4**) that is positioned closer to the second grounding member **400** than the mount portion **310** to the second grounding member **400** in the top-to-bottom direction. This arrangement of the first conducting portion **320** and the mount portion **310** contributes to downsizing of the first grounding member **300**, compared to an arrangement in which the first conducting portion **320** is connected to the mount portion **310** such that the first conducting portion **320** is positioned farther from the second grounding member **400** than the mount portion **310** from the second grounding member **400**.

Further, both of the first conducting portion **320** and the second conducting portion **330** extend downward from the mount portion **310**. Hence, the first grounding member **300** can be assembled to the first cover member **210** by inserting the mount portion **310** into the supporting portion **213** from downward of the first cover member **210** for engaging the engaging hole **311** with the protrusion **214**.

The second grounding member **400** serves to ground the roller shaft **141** of the backup roller **140** via the ball bearing **142**. The second grounding member **400** is made from a metal plate and is positioned below the ball bearing **142**. The second grounding member **400** includes a second contact portion **410**, a grounding portion **420**, a connecting portion **430** connecting the second contact portion **410** and the grounding portion **420**.

The second contact portion **410** has an arcuate shape in a front view such that the second contact portion **410** extends in the left-to-right direction and is convex upward so as to be in contact with a lower surface of the ball bearing **142**. The connecting portion **430** has a substantially L-shape, extending from a left end portion of the second contact portion **410** first downward below the backup roller **140** and then leftward. The connecting portion **430** is supported to the casing (not shown) of the fixing device **100**. The grounding portion **420** is a leaf spring, extending diagonally upward and frontward from a front end portion of the connecting portion **430**. The grounding portion **420** is electrically grounded via a grounding member (not shown) disposed within the main frame **2**.

In the present embodiment, "electrical grounding" does not only mean that the second grounding member **400** is maintained at 0V, but also mean that the second grounding member **400** is maintained at a prescribed voltage, such as 5V or 10V, by providing a semiconductor that generates a predetermined voltage in a path of grounding the second grounding member **400**. Further, the grounding member disposed within the main frame **2** may be connected to a ground terminal of an electric outlet, or to a metal frame having a substantially large electric capacitance and disposed within the main frame **2**.

In the fixing device **100** having the above-described configuration, the fusing belt **110** is in contact with the nip plate **130**, thereby electrically connected thereto. The nip plate **130** nips the reflection member **150** in cooperation with the stay **160**, thereby electrically connected to the stay **160** via the reflection member **150**. That is, the fusing belt **110** is electrically connected to the stay **160** via the nip plate **130** and the reflection member **150**. In this way, the fusing belt **110** is electrically grounded via the stay **160**, the first grounding member **300**, the ball bearing **142** and the second grounding member **400**.

On the other hand, the roller shaft **141** of the backup roller **140** is electrically connected to the second grounding member **400** via the inner and outer races of the ball bearing **142**. The roller shaft **141** of the backup roller **140** is thus electrically grounded via the second grounding member **400**.

With this construction, the fusing belt **110**, which is electrically connected to the stay **160**, can be electrically grounded via the stay **160** which is grounded by the first grounding member **300**. The fusing belt **110** is thus suppressed from being charged, thereby suppressing degradation in print images from occurring.

Further, the first grounding member **300** is supported to the cover member **200** such that the first grounding member **300** is integrally movable with the cover member **200** that supports the nip plate **130** and the stay **160**. Hence, the stay **160** and the first grounding member **300** are stably positioned relative to each other, leading to stable grounding of the stay **160** by the first grounding member **300**.

The backup roller **140** includes the roller shaft **141** and the ball bearing **142** both made from a metal. The roller shaft **141** is grounded by the second grounding member **400** via the ball bearing **142**. Also, the first grounding member **300** is electrically connected to the second grounding member **400** via the roller shaft **141** and the ball bearing **142**. With this construction, grounding of the fusing belt **110** and the backup roller **140** can be achieved via a single path after the ball bearing **142** (via the ball bearing **142**, the second grounding member **400**, and thereafter).

The nip plate **130** and the stay **160** nip the reflection member **150** made of a metal. Hence, the nip plate **130** and the stay **160** can be electrically connected to each other, although the stay **160** supports the nip plate **130** via the reflection member **150**.

Further, the nip plate **130** and the stay **160** of the present embodiment are made from a metal. Therefore, fabricating the nip plate **130** and the stay **160** can be easier compared to a construction in which the nip plate **130** and the stay **160** are formed of a material without electrical conductivity whose surface is coated with a metal layer.

Further, in the embodiment, the fusing belt **110** is also formed of a metal. Therefore, simply bringing the nip plate **130** into contact with the fusing belt **110** can realize electrical connection between the fusing belt **110** and the nip plate **130**.

In the first grounding member **300** of the present embodiment, the first conducting portion **320** contacting the stay **160** is disposed closer to the second grounding member **400** than the mount portion **310** to the second grounding member **400**. The connecting portion **312** connecting the first conducting portion **320** and the second conducting portion **330** is also disposed closer to the second grounding member **400** than the mount portion **310** to the second grounding member **400**. As a result, a distance between the first conducting portion **320** and the second grounding member **400** can be made shorter, enabling the first grounding member **300** to be compact.

Further, the direction in which the first conducting portion **320** extends from the mount portion **310** (downward) is identical to that in which the second conducting portion **330** extends from the mount portion **310**. Hence, assembly of the first grounding member **300** to the cover member **200** can be facilitated.

Various changes and modifications are conceivable.

For example, the first grounding member **300** is not necessarily supported directly to the cover member **200** (first cover member **210**). Instead, the first grounding member **300** may be supported to the cover member **200** indirectly via a member provided separately from the cover member **200**.

Further, the fusing belt **110**, the nip plate **130**, the reflection member **150** and the stay **160** are all made from a metal in the depicted embodiment. However, the fusing belt **110**, the nip plate **130**, the reflection member **150** and the stay **160** may be formed of an electrically conductive resin. Still alternatively, the fusing belt **110**, the nip plate **130**, the reflection member **150** and the stay **160** may have electrically conductive surfaces. In this case, the fusing belt **110**, the nip plate **130**, the reflection member **150** and the stay **160** may be formed of a material without electric conductivity whose surface is coated with a metal layer.

In the depicted embodiment, the first contact portion **332** of the first grounding member **300** and the second contact portion **410** of the second grounding member **400** are in contact with the ball bearing **142**. In case that a bearing of the backup roller **140** is made from a resin without electric conductivity, the first contact portion **332** and the second contact portion **410** may be in direct contact with the roller shaft **141** of the backup roller **140**, as shown in FIG. **7**.

The first grounding member **300** and the second grounding member **400** are not necessarily to be formed as separate members, but be integrally formed with each other.

Instead of the thermostat **170**, a thermal fuse is also available as the electronic components.

Instead of the backup roller **140**, a belt-like pressure member is also available as the backup member.

Further, instead of the halogen lamp **120**, a carbon heater or an IH heater may also be available as the heater.

Further, the sheet S can be an OHP sheet instead of a plain paper and a postcard.

Further, in the depicted embodiment, the present invention is applied to the monochromatic laser printer **1** as an example of an image forming apparatus. However, the present invention may also be applicable to a color laser printer, and other image forming apparatuses such as a copying machine and a multifunction device provided with an image scanning device such as a flat head scanner.

While the invention has been described in detail with reference to the embodiments thereof, it would be apparent to those skilled in the art that various changes and modifications may be made therein without departing from the spirit of the invention.

What is claimed is:

1. A fixing device for thermally fixing a developing agent image to a sheet comprising:

a flexible tubular member having an inner peripheral surface defining an internal space;

a heater disposed at the internal space;

a nip member disposed at the internal space and configured to be in sliding contact with the inner peripheral surface of the flexible tubular member, the nip member having an electrically conductive surface;

a stay disposed at the internal space to support the nip member, the stay being electrically conductive and electrically connected to the electrically conductive surface;

a backup member configured to nip the flexible tubular member in cooperation with the nip member, the backup member including a shaft having an electric conductivity;

a supporting member configured to support the nip member and the stay, the supporting member being movable relative to the backup member;

a first grounding member disposed to be in contact with the stay for grounding the stay, the first grounding member being supported by the supporting member such that the first grounding member is integrally movable with the supporting member; and

a second grounding member connected to the shaft for grounding the shaft, the first grounding member being movable relative to the second grounding member in conjunction with movement of the supporting member relative to the backup member, the second grounding member being electrically connectable to the first grounding member via the shaft.

2. The fixing device as claimed in claim **1**, wherein the first grounding member comprises:

a supported portion supported by the supporting member;

a first conductive portion in contact with the stay and connected to the supported portion at a connecting portion; and

a second conductive portion connected to the first conductive portion via the connecting portion and electrically connected to the second grounding member;

wherein the first conductive portion is positioned closer to the second grounding member than the supported portion to the second grounding member, and the connecting portion is positioned closer to the second grounding member than the supported portion to the second grounding member.

3. The fixing device as claimed in claim **2**, wherein the first conductive portion extends from the supported portion in a direction, and the second conductive portion extends from the supported portion in a direction identical to the direction of the first conductive portion.

4. The fixing device as claimed in claim **3**, wherein the first conductive portion and the second conductive portion are bifurcated in an identical direction from the supported portion at the connecting portion.

5. The fixing device as claimed in claim **1**, further comprising a reflection member configured to reflect a radiant heat from the heater toward the nip member, the reflection member being electrically conductive;

wherein the nip member and the stay nip the reflection member therebetween to achieve electrical connection between the nip member and the stay.

6. The fixing device as claimed in claim **1**, wherein the nip member and the stay are formed of an electrically conductive metal.

7. The fixing device as claimed in claim **1**, wherein the flexible tubular member is formed of an electrically conductive metal.

8. The fixing device as claimed in claim **1**, wherein the supporting member is made of a resin and configured to cover the stay.

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